Abstract Submitted
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Physical modelling of LNG rollover in a depressurized container filled with water PETR DENISSENKO, MAKSIM DADONAU, University of Warwick, UK, ANTOINE HUBERT, SIAKA DEMBELE, Kingston University, UK, JENNIFER WEN, University of Warwick, UK — Stable density stratification of multi-component Liquefied Natural Gas causes it to form distinct layers, with upper layer having a higher fraction of the lighter components. Heat flux through the walls and base of the container results in buoyancy-driven convection accompanied by heat and mass transfer between the layers. The equilibration of densities of the top and bottom layers, normally caused by the preferential evaporation of Nitrogen, may induce an imbalance in the system and trigger a rapid mixing process, so-called rollover. Numerical simulation of the rollover is complicated and codes require validation. Physical modelling of the phenomenon has been performed in a water-filled depressurized vessel. Reducing gas pressure in the container to levels comparable to the hydrostatic pressure in the water column allows modelling of tens of meters industrial reservoirs using a 20 cm laboratory setup. Additionally, it allows to model superheating of the base fluid layer at temperatures close the room temperature. Flow visualizations and parametric studies are presented. Results are related to outcomes of numerical modelling.

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